ENVIRONMENTAL ADVISORY COUNCIL
Henry Center, Michigan State University
Lansing, Michigan
Thursday, July 16, 2009, 1:00 – 4:00 p.m.

Members in attendance**:** Jon Allan, Sandra Batie, Steve Chester, David Gard, Jeffrey Haynes, Chuck Hersey, Mindy Koch, Larry Merritt, Del Rector, Richard Rediske, Rhonda Ross, Mike Shriberg, Donna Stine, Andy Such, Gildo Tori, Willa Williams, and Paul Zugger.

DEQ Staff in attendance: Gerry Avery, Frank Baldwin, Liz Browne, George Bruchmann, Bill Creal, Harold Fitch, Amy Hicks, Jim Kasprzak, Lynelle Marolf, JoAnn Merrick, Becky Patrick, Frank Ruswick, Julie Sims, and Jim Sygo.

Guests: Dr. Joseph Arvai, Michigan State University, Lynne Boyd, DNR, and Jay Wesley, DNR.

OPENING

Director Chester opened the meeting by welcoming the EAC members, DEQ staff, and guests. The EAC members, DEQ staff, and guests introduced themselves.

CURRENT ISSUES

Director Chester shared a recent story from the New York Times regarding how the White House Council of Environmental Quality is rewriting standards for federal water projects; widening rules that guide the Army Corps Engineers in an effort to consider environmental and social goals as well as economic ones. He commented that this speaks volumes of the new administration.

Director Chester discussed that a reporter from the New York Times has been working on a story regarding an U.S. Environmental Protection Agency (U.S. EPA) review of state environmental enforcement efforts. Because many states question the U.S. EPA's methodology in conducting this review and therefore consider the results unreliable, the U.S. EPA had planned to only use the information internally. The reporter has recently acquired some of this data through the Freedom of Information Act, focusing on Clean Water Act enforcement. The data as presented is likely to imply a lack of enforcement by the states, including Michigan. Consequently, the theme of the story will likely be lack of enforcement of the Clean Water Act. Director Chester thinks an outcome of the U.S. EPA review and resulting story will be enforcement of the Clean Water Act becoming a priority for the U.S. EPA in the next couple of years.

A member asked how this story will impact Michigan. The Director expects there to be more pressure on the U.S. EPA to bring enforcement actions in Michigan.

A member asked about what appears to be a stronger role than in the past for the U.S. State Department in the review and renegotiation of the Great Lakes Water Quality Agreement. Director Chester was not aware of this and will follow-up with Ken DeBeaussaert, Director, Office of the Great Lakes.

IMPROVING DECISION-MAKING FOR RISK AND RESOURCE MANAGEMENT

Frank Ruswick introduced Dr. Joseph Arvai from Michigan State University. Dr. Arvai's research concentration is on advancing and testing theories in the decision sciences that deal with how people make decisions, both as individuals and in groups, and developing and testing decision aids that can be used to improve decision quality across a variety of contexts.

Dr. Arvai began his presentation (Attachment 1) with an overview of the normative perspective of decision-making, which is based on the idea that decision-making is based on economically-derived principles and rules that together provide a set of theoretical benchmarks for how people should perform decision making tasks under ideal conditions. The normative perspective is that decision-makers will make rational choices that always lead to the maximization of utility or welfare.

Dr. Arvai further explained how the six basic rules of rational decision-making: ordering of alternatives, dominance, cancellation, transitivity (preference reversal), invariance, and continuity. Using examples of the Expected Utility Theory, he demonstrated how making an actual rational decision is nearly impossible. According to the Expected Utility Theory, rational decisions require perfect information, which doesn't exist; assumes weights are static, which for many decisions changes over time; and recognizes that the process is too time consuming to be practical.

Dr. Arvai continued by describing how people actually make decisions (description perspective) using mental models, satisficing, heuristics and biases, prospect theory, affect, and constructed preferences. Dr. Arvai provided significant support for how these descriptive models (without decision support) can influence decision-making, ultimately leading towards a decision that may not be the most rational alternative. Dr. Arvai noted that there is never a "right choice," nor a magic bullet or equation to improve decisions. He also point out that more science does not necessarily equal a better decision.

The first descriptive perspective presented demonstrated how decision-makers are forced to make tradeoffs and in an effort to improve efficiency may evaluate alternatives using only certain attributes. Using this method, the decision maker is only using the attributes that are most satisfying and may be ignoring important attributes which could lead to potentially violating one of the six previously described rules of rational decision-making.

The second descriptive model presented was using mental models. This approach explains how people attempt to fit what they're responding to against their existing models, allowing people to make quick judgments about options by utilizing existing knowledge gained from past events. However, since mental models rely upon generalization and analogy, they can frequently trip us up and can be incorrectly applied

during a situation. Dr. Arvai provided several examples of how our mind responds to what it “believes” it is seeing.

The third descriptive model presented was regarding heuristics and biases. Basically, heuristics are "rules of thumb," or cognitive strategies that people use to make decisions in the face of data overload. Heuristics don't always work effectively and may lead to systematic errors—hence they are labeled biases.

Dr. Arvai provided several examples of heuristics and biases including the representative heuristic and anchoring without adjustment. These examples clearly demonstrated how heuristics and biases inform our own judgments when making decisions.

The fourth model of descriptive decision-making presented was Prospect Theory. The premise behind Prospect Theory is that losses typically appear larger than gains, which has implications for framing of decision problems and ultimately, people’s choices. One significant point was how people feel when losses and gains are being valued by others, such as the vast majority of policy decisions. In this particular scenario, there appears to be a fundamental distrust with ‘strangers’ making decisions for others.

Some implications of Prospect Theory include that decision-makers need to carefully assess the objectives, values, and concerns of affected stakeholders and highlights the importance of both increasing transparency in process and building social trust between decision-makers and affected stakeholders. This led to a discussion among participants regarding the difference between our culture and other European cultures and the level of trust and support for government service.

A member noted that this is likely why politicians hold social hours and point to specific people in the audience, share their story, so that it appears that they understand what they are going through.

Dr. Arvai emphasized that there is no magic bullet to making the best decisions, nor is there usually a “right” decision. It is important to understand that these decision-making theories and make decisions accordingly.

Dr. Arvai presented and facilitated discussion on how easy or hard a decision is to evaluate, or it’s evaluability. He stated that certain attributes of alternatives are inherently difficult to evaluate (e.g. amount of ice cream in a cup) while others are inherently easy to evaluate (e.g. fullness of a cup of ice cream). In this example, a side-by-side comparison of options enhances evaluability.

An important question to ask to better understand how people make decisions is what makes an attribute easy or difficult to evaluate. The answer is two fold: 1) it is our instinctive and rapidly formed emotional response (system 1) to the attribute and 2) it is our ability to undertake a detailed analysis (system 2), which is a function technical knowledge, of an attribute.

This discussion led to the fifth model of descriptive decision-making, which is using affect. Affect is a fast and intuitive emotional response that people instinctively experience in response to a stimulus. Dr. Arvai described a study that was done using

magnetic resonance imaging of the brain. This study showed how different parts of the brain light up depending on whether the stimulus was based on affect (system 1) or based on reasoning (system 2).

Dr. Arvai presented an example of how affect can influence an emotional response and ignore risk. The example he presented was on how much people were willing to spend on petty crime vs. deer over population in a park. In this scenario, the human health risk, environmental risk, and park property risk were lower for petty crime. However, since petty crime triggered an emotional (affect or system 1) response, people were willing to spend more money on addressing petting crime even though the risk was higher for deer over pollution. This study was repeated several times using different scenarios. Researchers found that the risk had to be nearly twice as high for deer over population for spending to even out when both addressing petty crime and deer over population.

Dr. Arvai presented other examples of how affect can influence decisions. One example was related to why there is a war on terrorism and not a war on failing infrastructure given that the actual risk of failing infrastructure is higher than the actual risk of terrorism. Clearly, terrorism has a much higher emotional response than separating combined sewers or rebuilding bridges.

The last descriptive model of decision-making presented was on constructed preferences. Preferences are constructed in response to certain stimuli by an "adaptive" decision-maker. Without decision aids, individuals and groups fall back on potential biased heuristics (e.g. anchoring) or other judgment strategies (e.g. statisficing) when constructing their preferences. Dr. Arvai provided an example of how when given a range of options, people tend to choose the one in the middle.

Dr. Arvai indicated that since people look to contextual clues and cues that are presented (or available) as part of the decision-making process, decision-makers can structure processes so contextual information and cues can help improve decision quality. These techniques include defining management problems, clarifying objectives and ways to measure their achievement, identifying alternatives and establishing their consequences across stated objectives, and informing tradeoffs.

There was discussion about the public perception of conducting tradeoff analysis and whether people liked 'rational' decisions better after using decision support. Dr. Arvai indicated that, in the end, people like the deliberative process whether they agree with the final decision or not. He also described how as a facilitator, you can't go in with your own objectives. Plus, as the issues or attributes become more important, the harder it is to conduct tradeoffs.

Dr. Arvai presented an example of providing decision support to determine how to invest money in an area that had three sites with known low levels of radiation. Two of the three sites had a low-affect response, while one site had a much higher-affect response. However, the site that had the highest-affect response had a lower overall risk to public health and the environment. The original information that was shared with stakeholders was very technical and in return, had very little meaning on how they evaluated options. Dr. Arvai's hypothesis was that something more understandable was needed including clear information.

In this example, an information piece was developed that presented information about each of the three contaminated sites using value-based conditions vs. technical, science-based conditions and stakeholders were able to prioritize their objectives (vs. prioritizing sites), and evaluate various options. The results of this work showed that subjects in the structured approach had a higher degree of satisfaction with choices, greater ease during decision-making, greater trust in providers of information, and a higher knowledge level. Plus, the structured approach better aligned funding with priorities.

This example led to a discussion about the value of science-based decision-making focusing on whether we are collecting the right data and expressing it in the right way. A member pointed out that science itself does not provide us with the right answer and that the decision-making process itself is important. One important point is that there is a need for staff with skills to conduct decision analysis.

Director Chester indicated that the public can't relate to decisions that the DEQ describes in technical terms and hence remains dissatisfied with our efforts. Dr. Arvai reemphasized the importance of communicating with stakeholders throughout the decision-making process and using language that is understandable.

Dr. Arvai closed his presentation and discussion with a few slides on decision quality. Generally, good decisions are ones that are consistent with objectives. However, for most decisions, we don't have control of the outcomes. For example, one could spend a lot of time doing the best decision analysis possible on a car purchase and the car could still turn out to be lemon. The only thing one can control is the process and there is a lot of literature and research that differentiates between good process and bad process. So, if you can control the process, implement the best process you can.

Members and staff discussed the current processes that are used and how people are still dissatisfied with the process and outcomes. A member added that good science or better science doesn't necessarily lead to a good decision. Dr. Arvai again emphasized that there is no "right" answer in these contexts, but the right process can pull people along the way to support a decision in the end.

CLOSING

Frank closed the meeting and thanked Dr. Arvai for his very informative presentation and discussion.